REMARKS

Claims 1, 2, 4-26, 28-49, and 51-61 remain in the subject application with claims 1, 25, and 48 in independent form. Claims 1, 10, 11, 25, 48, 57, and 58 have been amended. Claims 3, 27, and 50 have been cancelled and claims 59-61 have been added. There is full support in the specification as originally filed for these amendments and additional claims. Accordingly, no new matter has been introduced.

Applicant is submitting a petition for a one-month extension of time which is accompanied by the fee required under 37 C.F.R. §1.17(a)(1). The mailing date of the Office Action was December 14, 2004 and the three-month response date was March 14, 2005. The petition seeks to extend to period for reply to April 14, 2005 and the subject amendment is being filed during this extended period.

Applicant is also submitting a Supplemental Information Disclosure Statement (IDS) under 37 C.F.R. §1.97(c)(2) which is accompanied by the fee required under 37 C.F.R. §1.17(p). The submission of this Supplemental IDS resulted from a search related to a related foreign patent application filed under the Patent Cooperation Treaty, as well as references uncovered by the Examiner in related United States patent applications. It is believed that the references uncovered are duplicative of the references that have been previously cited in the IDS originally filed with the subject application. Specifically, these references are directed toward using a chain extender in forming either of a microcellular elastomeric polyurethane foam or a polyisocyanurate foam, not a viscoelastic polyurethane foam. Applicant is not claiming to have invented chain extenders in and of themselves; however, Applicant is claiming to have been the first to successfully incorporate the chain extender in the claimed amount into viscoelastic polyurethane foams. Such inclusion of the chain extender provides greater flexibility in

producing the viscoelastic polyurethane foam with a desired glass transition temperature that is closer to a use temperature of the viscoelastic polyurethane foam.

As discussed in the "Background of the Invention" section of the subject application as originally filed, related art viscoelastic polyurethane foams have a narrow processing window to arrive at a desired glass transition temperature (Tg) that coincides with a use temperature of the viscoelastic polyurethane foam. Most related art viscoelastic polyurethane foams have a single Tg near 0 °C which severely limits the uses of the viscoelastic polyurethane foams. The subject invention has overcome such a problem by allowing the Tg to be manipulated to accommodate various use temperatures while also providing characteristics that are desired for viscoelastic polyurethane foam.

Claims 1-58 stand provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-41 of copending Application No. 10/916,241 and claims 1-44 of copending Application No. 10/607,555. Applicant submits herewith a timely filed Terminal Disclaimer in compliance with 37 C.F.R. §1.321(c) which is accompanied by the fee required under 37 C.F.R. §1.20(d). It is believed that the Terminal Disclaimer overcomes these provisional double patenting rejections.

As well known to those skilled in the art (and as also disclosed in Kageoka et al. at col. 5, lines 23-30), the functionality and hydroxyl number of a polyol can be used to determine the molecular weight in accordance with the following formula:

$$MolecularWeight = \frac{56{,}100 * f}{OH\#}$$

where f is the functionality of the polyol; and
$OH\#$ is the hydroxyl number (mg KOH/g).

Claims 59-61 have been added and paragraph [0030] of the specification as originally filed has been amended. In paragraph [0030], the chain extender is described as having a molecular weight of less than 1000, preferably from 25 to 250, and more preferably less than 100. Further, in paragraph [0031], the chain extender is described as having two isocyanate reactive groups. With knowledge of the molecular weight and the functionality for the chain extender, a person of ordinary skill in the art, relying on the above-referenced mathematical formulation can easily deduce the hydroxyl number that is now incorporated into the specification and the claims.

The preferred molecular weight of the chain extender is from 25 to 250. The corresponding hydroxyl numbers can be calculated using the above formula. At a molecular weight of 25 and a functionality of 2, the hydroxyl number is (56,100*2)/25, or 4,488 mg KOH/g. At a molecular weight of 250 and a functionality of 2, the hydroxyl number is (56,100*2)/250, or 448.8 mg KOH/g. Therefore, the hydroxyl number is preferably more than 450 mg KOH/g. Claims 59-61 claim the chain extender having a hydroxyl number of greater than 450 mg KOH/g and paragraph [0030] has bee amended to recite that the chain extender has the hydroxyl number greater than 450 mg KOH/g. There is full support in the specification as originally filed for these amendments and new claims. Accordingly, no new matter has been introduced.

Claims 1-58 stand rejected under 35 U.S.C. §102(b) as being anticipated by Kageoka et al. (United States Patent No. 6,204,300) and EP 0,934,962, each taken individually. The '300 patent and EP '962 both claim priority to JP 10-026149 and JP 10-246627. Therefore, they are deemed to be equivalents and will be referred to collectively hereinafter as Kageoka et al. The Examiner states that Kageoka et al. discloses polyurethane foams formed from isocyanates and blends of polyols as claimed.

Further, the Examiner contends that the polyols of Kageoka et al. meet the function of the claimed chain extender in the subject application.

Claim 1, 25, and 48 has been amended to recite that the chain extender has a molecular weight of from 25 to 250, which was previously set forth in now cancelled claims 3, 27, and 50. Since claims 3, 27, and 50 also stand rejected under 35 U.S.C. §102(b), Applicant respectfully traverses the §102(b) rejection at the threshold of original dependent claims 3, 27, and 50.

The subject invention claims a viscoelastic polyurethane foam having a density of from one to thirty pounds per cubic foot and a composition and method for forming the same. The viscoelastic polyurethane foam comprises a reaction product of an isocyanate component, an isocyanate-reactive component, and a chain extender. As claimed, the chain extender has a backbone chain with from two to eight carbon atoms and a weight-average molecular weight of from 25 to 250. Also as claimed, the chain extender is used in an amount of from 5 to 50 parts by weight based on 100 parts by weight of the viscoelastic polyurethane foam and the resultant viscoelastic polyurethane foam has a glass transition temperature of from 5 to 65 degrees Celsius and a tan delta peak of from 0.40 to 1.75.

It is the novel and unique combination of the chain extender in the amounts of from 5 to 50 parts by weight that permits adjustment of the Tg for the viscoelastic polyurethane foam. As discussed in paragraph [0032] of the specification as originally filed, "the chain extender and the isocyanate component react to form urethane hard segments within the viscoelastic polyurethane foam that are incorporated into the soft segment phase and raise the soft segment Tg. The soft segment phase is typically the isocyanate-reactive component. The incorporation of the chain extender in the amounts

claimed allows adjustment of Tg over a wide range of temperatures, independent of a density of the viscoelastic polyurethane foam, which was not previously possible." The subject invention also provides flexibility to produce viscoelastic polyurethane foams with a wide range of Tg's, by adjusting the chain extender level, which further broadens the applications of the resultant viscoelastic polyurethane foam.

In contrast, Kageoka et al. discloses a low resilience urethane foam that is formed from a) a polyol, b) a polyisocyanate, c) a catalyst, and d) a blowing agent. The polyol (a) is at least one polyol selected from the group consisting of polyoxyalkylene polyol, vinyl polymer-containing polyoxyalkylene polyol, polyester polyol, and polyoxyalkylene polyester block copolymer polyol *(see col. 3, lines 24-28).* It is appreciated by those skilled in the art that such polyols used as a backbone resin for foam are not chain extenders. Instead, these polyols typically have a carbon chain of more than 2 to 8 carbon atoms and a molecular weight significantly higher than 250.

Kageoka et al. further defines each type of polyol listed above. Polyalkylene polyols include alkylene oxide added to initiators, such as water, alcohol, amine and ammonia. Vinyl polymer-containing polyoxyalkylene polyols have vinyl monomers polymerized and stably dispersed in the polyoxyalkylene polyols. Polyester polyols are obtained by condensation polymerization compounds having two or more hydroxyl groups and compounds having two or more carboxyl groups. Polyoxyalkylene polyester block copolymer polyols have the structure of polyoxyalkylene polyol blocked by a polyester chain *(see col. 3, lines 29-67, and col. 4, lines 1-30).*

Further, Kageoka et al. discloses that the polyol (a) includes a combination of a first polyol (a-1) and a second polyol (a-2). The first polyol (a-1) is present in an amount of from 32-80 weight percent and the second polyol (a-2) is present in an amount of from

20-68 weight percent. The first polyol (a-1) has an average functionality of from 1.5 to 4.5 and a hydroxyl value, or number, from 20 to 70 mg KOH/g. The second polyol (a-2) has an average functionality of from 1.5 to 4.5 and a hydroxyl value, or number, from 140 to 300 mg KOH/g *(see col. 4, lines 31-67).*

The functionality, hydroxyl number, and molecular weight can be calculated according to the well known formula listed above. The following tables illustrate the calculated molecular weight of the first polyol (a-1) and the second polyol (a-2) based upon possible combinations of the functionality and hydroxyl number.

Polyol (a-1)		
Functionality	Hydroxyl Number (mg KOH/g)	Molecular Weight
1.5	20.0	4,207.5
1.5	70.0	1,202.1
2.0	20.0	5,610.0
2.0	70.0	1,602.9
2.5	20.0	7,012.5
2.5	70.0	2,003.6
3.0	20.0	8,415.0
3.0	70.0	2,404.3
3.5	20.0	9,817.5
3.5	70.0	2,805.0
4.0	20.0	11,220.0
4.0	70.0	3,205.7
4.5	20.0	12,622.5
4.5	70.0	3,606.4

Polyol (a-2)		
Functionality	Hydroxyl Number (mg KOH/g)	Molecular Weight
1.5	140.0	601.1
1.5	300.0	280.5
2.0	140.0	801.4
2.0	300.0	374.0

2.5	140.0	1,001.8
2.5	300.0	467.5
3.0	140.0	1,202.1
3.0	300.0	561.0
3.5	140.0	1,402.5
3.5	300.0	654.5
4.0	140.0	1,602.9
4.0	300.0	748.0
4.5	140.0	1,803.2
4.5	300.0	841.5

The first polyol (a-1) has a molecular weight range of from 1,202.1 to 12,622.5 and the second polyol (a-2) has a molecular weight range of from 280.5 to 1,803.2. Each of these ranges is significantly higher than the range of molecular weight for the possible chain extenders that are used with the subject invention.

Based upon the foregoing, Kageoka et al. does not disclose a chain extender for incorporation into a viscoelastic polyurethane foam as now claimed in amended claims 1, 25, and 48. Further, even if the polyols of Kageoka et al. function as the chain extender, as the Examiner contends, Kageoka et al. does not disclose a chain extender having a molecular weight of from 25 to 250. Because Kageoka et al. does not disclose each and every element as now claimed in the amended claims, Applicant respectfully submits that the 35 U.S.C. §102(b) rejection is overcome and that claims 1, 2, 4-26, 28-49, and 51-61 are believed to be allowable.

As discussed above, it well understood by those skilled in the art that chain extenders are significantly different than polyols used as a resin backbone for a viscoelastic polyurethane foam. Polyols that are used as the resin backbone create the soft segments of the viscoelastic polyurethane foam, whereas the chain extenders react with the isocyanate to create hard segments. Viscoelastic polyurethane foam is

characterized by the vitrification of these hard segments and these hard segments produce the physical characteristics that are specific to viscoelastic polyurethane foam. Therefore, the subject invention has determined that the physical characteristics of the viscoelastic polyurethane foam can be further manipulated by incorporation of the chain extender in the amounts claimed while limiting the negative drawbacks of such inclusion. None of the cited art references, alone or properly combined, disclose, teach, or suggest such a novel and unobvious combination to arrive at the results of the subject invention.

Accordingly, it is respectfully submitted that the Application, as amended, is now presented in condition for allowance, which allowance is respectfully solicited. Applicant believes that no fees are due, however, if any become required, the Commissioner is hereby authorized to charge any additional fees or credit any overpayments to Deposit Account 08-2789.

Respectfully submitted

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4/14/05

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CERTIFICATE OF EXPRESS MAILING

I hereby certify that this Amendment, One-Month Extension of Time, Supplemental Information Disclosure Statement, Forms PTO/SB/08A, PTO/SB/08B, Terminal Disclaimer and fees for United States Patent Application Serial Number 10/606,825 filed June 26, 2003 are being deposited with the United States Postal Service as Express Mail, Label No. EV618892962US postage prepaid, in an envelope addressed to, Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450 on April 14, 2005.

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